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FACT SHEET

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FOR PART-TIME
FARMERS AND
GARDENERS



UNITED STATES
DEPARTMENT
OF AGRICULTURE

SIGNS OF CROP HUNGER

Plants often show recognizable deficiencies when the soil can't provide enough nutrients. Undernourished plants grow slowly and develop abnormally, much the same as animals on deficient rations.

Nutrient deficiencies may show in many ways: off-colored leaves; abnormally shaped leaves, stems, and roots; and breakdowns of certain parts of the plant, including the root system. Quality and yield suffer when nutrition is inadequate.

Be careful to distinguish between various underlying causes of deficiency systems you see. Nitrogen deficiencies are often mistaken for inadequate moisture. Insect damage may look like a nutrient deficiency. Inadequate lime in the soil can cause multiple symptoms. Herbicides sometimes affect root and top development, thereby impairing nutrient uptake.

How Toxicities May Develop

Toxicities may develop when there's a nutrient imbalance in plants. Complicated systems may result from deficiencies of two or more nutrients. Diagnosis is most accurate when only one nutrient is limited.

Deficiencies generally appear first in the oldest leaves of a plant when nitrogen, phosphorus, potassium, magnesium, or sulfur is limited. These nutrients can move from one part of the plant to another. The youngest leaves and terminal buds show a deficiency when calcium, boron, manganese, or iron is limited. These nutrients do not move about in the plant. When deficiencies of these types appear, diagnosis is most accurate and useful when you can use a combination of visual observation, tissue tests, and field and laboratory soil tests.

How To Check for Hunger Signs

Be thorough in checking hunger signs. Compare sick plants with normal ones, and examine new and older leaves. Examine stems and stalks, root systems, and the ears of grain. Split the stalks and study the internal circulation system. Don't overlook possible contributing causes: disease, insects, herbicides, temperatures, physical soil conditions, or moisture conditions. Plants suffering from lack of nutrients are often susceptible to and damaged by diseases and some insects.

Remember that when visual hunger signs appear, the plant, and probably the soil surrounding it, has an insufficient amount of one or more nutrients. "Hidden hunger" may be detected by tissue tests, soil tests, and plant analysis. Nutrient insufficiencies can often be corrected for subsequent crops with fertility treatments and management. The following paragraphs describe the physical appearance of certain classes of plants when a shortage of various nutrients exists.

Corn and Sorghum

Nitrogen. Yellowing from leaf tip and along midrib while edges remain green (oldest leaves affected first), spindly stalks, stunted growth, small ears (fail to fill at tip), pinched-off ear tips, glassy kernels, light brown stover at maturity, poor yields.

Phosphorus. Slow early growth, abnormal bluish-green color, purplish-colored stalks and leaf tips of young plants (may be characteristic of some varieties), weak stalks, shallow root system, delayed emergence of silks, imperfect pollination and barren stalks, missing rows of kernels on ears, small twisted or curved ears, retarded maturity. Reddish-purple color at maturity is not a phosphorus deficiency.

Potassium. Firing or drying at tips and along leaf edges (oldest leaves affected first), ragged leaf edges, iron accumulations in joints, weak stalks and excessive lodging, short internodes, poorly filled ear tips, chaffy nubbins (loose starchy kernels), weak roots (rot off), slow maturity.

Calcium and Low pH. Yellowish-green foliage color (similar to nitrogen deficiency), nitrate absorption or reduction may be restricted, brace roots high on base of stalk, discolored and decayed root system, stunted, spindly growth, weak stalks, enlarged nodes.

Magnesium. White or yellowish-white streaks parallel with leaf veins, stunted growth, chlorosis.

Zinc. Dwarfing and white or yellowish-white streaking or bleaching between leaf veins (most pronounced on youngest leaves), green color maintained along midrib and leaf edges, distinctive slickness of affected tissue after rubbing, incomplete unfurling of emerging leaves. Deficiencies may occur when topsoil is removed (as in leveling or terracing), or when plants are in poorly drained spots in cool wet weather.

Small Grains and Grasses

Nitrogen. Leaves and stalks pale yellowish-green with extreme yellowing of lower leaves of young plants (yellowing starts at leaf tip of older leaves and may be induced by water-logged soils), spindly stems and short heads, poor yields.

Phosphorus. Winter starvation (killing); slow, dwarfed growth; abnormal bluish-green color of foliage; slow maturity; shriveled and small grains; poor yield.

Potassium. Winter starvation (killing), short, weak, stems and stalks, excessive lodging, shriveled grain, yellowing of leaves that turn brown and finally die (older leaves affected first), slow maturity, underdeveloped root system. The presence of potassium may contribute to accumulation of toxic amounts of soluble nitrogen compounds and relatively low protein content.

Calcium and Low pH. Poor germination and death of seedlings, yellowish-green foliage color (similar to nitrogen deficiency), probable restriction of nitrate absorption or reduction, winter starvation (killing), underdeveloped root system, stunted root system, malformations.

Magnesium. Yellowish-green patches (leaf veins remain green), upward curling of leaf edges, dwarfed growth.

Cotton

Nitrogen. Yellowish-green foliage; premature drying up and shedding of older leaves; slow, stunted growth; nondevelopment of fruiting branches.

Phosphorus. Dwarfed plants, abnormal bluish-green color of leaves, delayed fruiting and maturity.

Potassium. Yellowish-white mottling of leaves (the start of "rust"), scorching and downward curling of tips and margins of leaves, reddish-brown leaves that dry and shed prematurely, dwarfed immature bolls.

Calcium and Low pH. Poor germination and emergence, death of seedling plants, yellowish-green foliage color (similar to nitrogen deficiency), limited and delayed fruiting, bending and collapse of leaf petioles, underdeveloped root system, delayed maturity.

Magnesium. Purplish-red leaves with prominent green veins (older leaves of young plants affected first), premature leaf shedding.

Soybeans

Calcium and Low pH. Slow, stunted, spindly growth; pale yellowish-green color (similar to nitrogen deficiency); poor nodulation; and poor yield.

Phosphorus. Slow growth and poor quality seed.

Potassium. Irregular yellow mottling on leaflet edges that dry and curl downward (older leaves affected first); ragged leaf edges resulting from the fall of dead leaf tissue; shriveled, poorly shaped seed; delayed maturing of seed; and poor yields.

Molybdenum. General yellowing and stunting with visual symptoms similar to those of nitrogen deficiencies, poor nodulation and root development. Deficiencies are most likely when limestone is needed to neutralize excessive acidity.

Alfalfa, Clovers, Lespedeza

Calcium and Low pH. Death of seedlings; disappearance of stand; stunted, slow growth; pale yellowish-green color (similar to nitrogen deficiency); poor nodulation and growth; spotty stands of biennials and perennials; white pin-point dots irregularly spread over older leaf surfaces (spots turn gray and enlarge until entire leaf is affected); collapsed petioles that may cause leaves to droop, wither, and die; small, slim, pointed, and unfolded young leaves; short leaf petioles; excessive heaving and winter kill.

Magnesium. Pale yellowish-green color (chlorosis) between main leaf veins (color later turns deep yellow except at leaf base); cupped and curled dead edges of upper leaves (tissue remains intact).

Phosphorus. Slow growth, spindly plants, abnormal bluish-green color, slow regrowth of alfalfa after cutting, upward turned petioles and leaflets.

Potassium. Tiny white spots at leaflet edges (later merging into irregular, brown, dried leaf margins), premature shedding of older leaves, lack of vigor and winter hardiness, stunted growth and poor yields, increase of deficiency as season progresses.

Nitrogen. Pale yellowish-green color, premature loss of older leaves, poor nodulation and root development. Nitrogen deficiencies may be caused by inadequate limestone or inoculation.

Boron. Alfalfa—Yellowing of uppermost leaves with normal green leaves on rest of plant, short internodes and short leaf petioles giving terminal growth a "rosette" or "umbrella" appearance, new growing tip from a side branch as terminal growth ends. Boron deficiencies are most prevalent in dry seasons and after first cutting.

Various Other Crops

Sulfur. Pale green to yellowish young leaves, including veins; slow, stunted growth.

Manganese. Manganese is seldom encountered as a deficiency. Highly acid soils may result in toxicities from excess available manganese.

Zinc. Dwarfing and yellow striping between leaf veins, inferior seed formation. Deficiencies may be encountered with deep cuts and topsoil removal, as in land leveling. Excesses may be toxic.

Copper. Dwarfing of plant, excessive leaf shedding.

Molybdenum. Yellowed leaves, stunted growth of legumes (most likely to occur with poor lime situation).

All Crops

Drought and Moisture Deficiency. Wilting and upward rolling of youngest leaves (leaves usually unfurl during night and early morning), premature drying and death of leaf tissue, yellowish color if nitrogen is also deficient. Plants are affected from the top down with moisture deficiencies, and from the bottom up with most nutrient deficiencies.

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